

# Medical Science

25(114), August, 2021

## Knowledge and perception of bariatric surgery among physicians at King Saud University Medical City, Riyadh, Saudi Arabia

**To Cite:**

Alotaibi AF, Hassan AA, Almogheer WS, Abouammoh N, Younis AS. Knowledge and perception of bariatric surgery among physicians at King Saud University Medical City, Riyadh, Saudi Arabia. Medical Science, 2021, 25(114), 2056-2067

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**Peer-Review History**

Received: 20 July 2021

Reviewed & Revised: 23/July/2021 to 09/August/2021

Accepted: 10 August 2021

Published: August 2021

**Peer-review Method**

External peer-review was done through double-blind method.

### ABSTRACT

**Background:** Bariatric surgeries were among the common solutions provided by nutritionists and physicians to avoid obesity complications, especially among chronic diseases patients. **Aim:** The present study aimed at identifying the level of perception among physicians working in King Saud University Medical City (KSUMC) about the role of bariatric surgery in managing obesity and at identifying factors influencing referral patterns. **Method:** A descriptive cross-sectional survey was administered over a sample of 127 physicians from King Saud University Medical City (KSUMC) in Riyadh city, Saudi Arabia. The study questionnaire consisted of 27 questions designed to explore the perceptions toward treating and managing of bariatric patients, total knowledge about benefits of bariatric surgery. **Results:** The findings of the study revealed that 70% (n=89) had an access to suitable resources and equipment to manage morbid obese patients. The findings indicated that 67.7% (n=86) of the recruited physicians had adequate level of knowledge regarding whom to contact when encountering difficulties related to the management of morbid obese patients. In the second rank were the causes related to poor of awareness about procedures or benefits, concerns with follow up, and psychological issues (21.4%, n=6). The Univariate analysis showed that 5.7 times likelihood to refer patients to bariatric surgery among physicians aged 36 to 45 years (OR: 5.7, CI: 0.655-49.577, P=0.118). **Conclusion:** The study concluded that there is an adequate level of knowledge and positive perceptions of physicians regarding bariatric surgery. Nevertheless, the poor resources and poor awareness were main barriers for non-referral to bariatric surgery.

**Keywords:** Bariatric Surgery, KSUMC, Perceptions, Family Medicine, Obesity.



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## 1. INTRODUCTION

Obesity has become one of the most common and chronic nutritional problems worldwide. It tends to impact more than one third of the population and result in 5% of all deaths globally (Lau et al., 2009; Semlitsch et al., 2019). In Saudi Arabia, it was reported that 24.1% of the females and 33.5% of the males are obese, while the prevalence of overweight among males and females was 33.4% and 28.0% respectively, according to Saudi Health Interview Survey (Memish et al., 2013). Obesity-related comorbidities including type 2 diabetes, hyperlipidemia, hypertension, asthma, obstructive sleep apnea, hypertrophic cardiomyopathy, cholelithiasis, and psychosocial impairment have been studied extensively (Mokdad et al., 2001). The 2002 World Health report estimated that >2.5 million deaths every year were due to weight-related comorbidities (Norum, 2005). As a consequent, a wide range of physicians at different specialties expose to patients with obesity and obesity-related comorbidities in everyday clinical practice (Buchwald & Williams, 2003).

It has been shown that sustained weight reduction is strongly related with the prevention, improvement, and resolution of these detrimental health effects (Dhabuwala et al., 2000). Studies have demonstrated that traditional dieting attempts and lifestyle modifications often fail to achieve long-lasting results in patients with morbid obesity (Deitel, 2005). The role of pharmaceutical therapy in treating obesity is relatively ineffective; however, bariatric surgery has emerged as the most effective and currently available treatment in obese patient populations. Most patients with obesity-related comorbidities lose an average of 30 kg after undergoing bariatric surgery and experience complete health resolution or improvement in the long-term (Maggard et al., 2003).

Although medical physicians acknowledge the advantages of bariatric surgery for patients who are eligible for surgery, it is still sporadically suggested, and the numbers of those morbidly obese patients are inconsistent with their referral percentages (Avidor et al., 2007; Ferrante et al., 2009; Salinas et al., 2011; Sansone et al., 2007). The American Society for Metabolic and Bariatric Surgery and the Estimate of Bariatric Surgery Numbers estimated that less than 1% of American obese patients who are qualified for bariatric surgery underwent surgery between 2011-2017 (Dixon et al., 2008; Funk et al., 2015; Ponce et al., 2015; Imbus et al., 2018). Reasons for the low referral rates and the barriers influencing the use of bariatric surgery are of manifolds (Imbus et al., 2018).

In spite of the importance role of bariatric surgery in the management of chronic diseases among physicians, no local nor regional studies have been found. The aim of this study is to identify the level of perception among physicians working in King Saud University Medical City (KSUMC) about the role of bariatric surgery in their management of obesity and to identify factors that influence referral patterns. We also aim to discover their interest in learning more about bariatric surgery. Results from this study could be used to inform the service in KSUMC and other hospitals in Saudi Arabia in order to improve referral to bariatric surgery as an effective treatment for selected obese patients.

## 2. METHODOLOGY

This study is a single-centered, cross-sectional study that was conducted at King Saud university medical city (KSUMC), Riyadh, Saudi Arabia during December 2020 to March 2021. KSUMC is a tertiary care center in Riyadh, Saudi Arabia. The study population included doctors with varying medical specialties. All physicians (consultant, fellows, and registrars) at King Saud university medical city were included, and they were 201 physicians. Inclusion criteria were family physicians, internist physicians, obstetrics and gynecology physicians, general surgery physicians, and orthopedic physicians who work under the KSUMC. Exclusion criteria were physicians from other specialties. The study assess the knowledge and perception of bariatric surgery among physicians at king Saud university medical city using a pre designed validated questionnaire developed by Auspitz et al., (2016).

The questionnaire was self-administered, online based; copyright permission was obtained through email. The survey consists of 27 questions intended to assess the perception toward treatment and management of bariatric patients, overall knowledge regarding benefits of bariatric surgery, and awareness of institutional resources available for these patients. An electronic copy of the survey was developed using survey by Google form and distributed to all King Saud University Medical City (KSUMC) physicians with an email address. A total of 201 physicians were invited to complete the survey. The included variables were the age, gender, previous referrals, level, years in practice, and specialty. The protocol for this research project was approved by the Institutional Review Board (IRB) (Ref. No. 20/0004/IRB).

The demographic characteristics and responses between physicians who had made previous referrals for surgery versus those with no history of referral were compared using univariate analysis. Data were described in this study as frequencies and percentages. The associations between independent and dependent variables were tested by chi square test and Fisher exact test as appropriate. The significance level for all group comparisons was set at a p value <0.05. Statistical analysis was conducted using IBM SPSS Statistics 24 (IBM Corp., Armonk, NY).

### 3. RESULTS

The present study sought to identify the level of perception among physicians working in King Saud University Medical City (KSUMC) about the role of bariatric surgery in their management of obesity and to identify factors that influence referral patterns. A total of 127 physicians were enrolled in the present study. This section provides an overview of the study findings related to study variables and parameters.

The findings shown in table 1 represent the demographic characteristics of the physicians enrolled in this study. As shown in table 1, physicians who were aged 26 to 35 years constituted 36.2% (n=46) of the study participants, followed by the physicians who were 36 to 45 years old (31.5%, n=40). The least represented age categories were physicians aged 66 to 75 as there was only one physician (0.8%). Categorizing the participating physicians based on their gender revealed that males constituted 57.5% (n=73), whereas females were constituting 42.5% (n=54) of the recruited study sample. In terms of years of practice, it was found that physicians who had an experience of 6 to 10 years constituted 29.9% (n=38), while physicians whose years of experience ranged from 11 to 15 years were ranked second (18.1%, n=23). The least represented category were those physicians who had 21 to 25 years of experience as they constituted 7.9% (n=10). Moreover, it was found that family medicine physicians constituted 30.7% (n=39), whereas internal medicine physicians and obstetrics and gynecology physicians constituted 27.6% (n=35) and 17.3% (n=22), respectively. In addition, the results showed that the orthopedic physicians were constituting 15.7% (n=20), while general surgery physicians were the lowest represented category among the study participants (8.7%, n=11).

Exploring the level of the participating physicians revealed that consultants were 63.9% (n=81), whereas fellows and registrars were constituting 26.8% (n=34) and 9.4% (n=12), respectively. Finally, it was found that 62.2% (n=79) of the enrolled physicians had a weekly patient load of 26 to 50 patients, whereas 18.9% (n=24) had less than 25 patients weekly. In addition, 13.4% (n=17) had a weekly patient load of 51 to 100 patients. However, only 5.5% (n=7) of the enrolled physicians had a weekly patient load of more than 100 patients.

**Table 1** Demographic Characteristics of physicians enrolled

Variable	N (%)
<b>Age</b>	
26-35	46 (36.2)
36-45	40 (31.5)
46-55	14 (11)
56-65	26 (20.5)
66-75	1 (0.8)
<b>Gender</b>	
Male	73 (57.5)
Female	54 (42.5)
<b>Years in practice</b>	
0-5	15 (11.8)
6-10	38 (29.9)
11-15	23 (18.1)
16-20	21 (16.5)
21-25	10 (7.9)
>=26	20 (15.7)
<b>Specialty</b>	
Family medicine	39 (30.7)
Internal medicine	35 (27.6)
Obstetrics and gynecology	22 (17.3)
General surgery	11 (8.7)
Orthopedic	20 (15.7)
<b>Level</b>	
Consultant	81 (63.9)

Registrar	12 (9.4)
Fellow	34 (26.8)
<b>Patient load per week</b>	
<25	24 (18.9)
26-50	79 (62.2)
51-100	17 (13.4)
>100	7 (5.5)

As shown in table 2, about 90.6% (n=115) of the enrolled physicians reported that they measure the patient's weight each visit, whereas only 3.9% (n=5) were used to measure their patient's weight every year and 5.5% (n=7) reported that they never measured patient's weight. The BMI measurement was used as an additional measurement by 95.3% (n=121), whereas waist circumference was used by 4.7% (n=6) of the enrolled physicians. The findings of this study showed that about 57.5% (n=73) of the enrolled physicians initiate conversation with patients about bariatric surgery, while 25.2% (n=32) sometimes initiate this type of conversation and 17.3% (n=22) do not initiate any conversation related to bariatric surgery with their patients. Moreover, the results showed that 70% (n=89) had an access to appropriate resources and equipment for managing morbidly obese patients. The results showed that 67.7% (n=86) of the enrolled physicians had sufficient of knowledge of who to contact if having difficulty managing patients with morbid obesity. Moreover, it was found that 88.1% (n=111) referred patients to bariatric surgery before.

The findings showed that 32.3% (n=41) of the enrolled physicians had 6 to 10 patients who have had bariatric procedures before, whereas 29.1% (n=37) had more than 20 patients who have had bariatric procedure before and 22.8% (n=29) had one to five patients who have had bariatric surgery before. About 44.9% (n=57) of the enrolled physicians reported that less than 21% of the patients seen in the last 12 months were morbid obese (BMI>35). However, 25.2% (n=32) of the physicians reported that among the patients seen within the last 12 months, about 12 to 30% were morbid obese (BMI>35), and 23.6% (n=30) had 31 to 40% morbid obese patients among the patients seen in the last 12 months. Exploring the reasons of no referrals to bariatric surgery revealed that lack of resources was the most reported reasons (25%, n=7), whereas lack of awareness about procedure or benefits, concerns with follow up, and psychological issues were the secondly ranked reasons for no referrals (21.4%, n=6). Disagree with procedure was reported as another reason by 17.9% (n=5) of the physicians reporting no referrals.

The results showed that 10.7% (n=3) reported that discomfort within own setup to manage patients is the main reason for no referral for bariatric surgery. However, the same percentage reported that medical issues are their main reason for no referral for bariatric surgery.

**Table 2** Physician's management of obese patients

Variable	F (%)
<b>Measurement of patients' weight</b>	
Each visit	115 (90.6)
Every year	5 (3.9)
Never	7 (5.5)
<b>Additional measurements used</b>	
BMI	121 (95.3)
Waist circumference	6 (4.7)
<b>initiate conversations with patients about bariatric surgery</b>	
No	22 (17.3)
Yes	73 (57.5)
Sometimes	32 (25.2)
<b>Access to appropriate resources and equipment for managing morbidly obese patients</b>	
for managing morbidly obese patients	89 (70)
<b>Knowledge of who to contact if having difficulty managing patients with morbid obesity</b>	
Referrals for bariatric surgery	86 (67.7)
Referred patients for bariatric surgery	111 (88.1)

number of patients who have had bariatric procedures before	
0	6 (4.7)
1-5	29 (22.8)
6-10	41 (32.3)
11-15	10 (7.9)
16-20	4 (3.1)
>20	37 (29.1)

Percentage of patients with morbid obesity (BMI>35) seen in 12 months	
<21%	57 (44.9)
21-30 %	32 (25.2)
31-40%	30 (23.6)
41-50%	3 (2.4)
>50%	5 (3.9)

Reasons for no referral	
Lack of resources	7 (25)
Limited benefits from procedure	0
Disagree with procedure	5 (17.9)
Lack of awareness about procedure or benefits	6 (21.4)
Concerns with follow up	6 (21.4)
Discomfort within own setup to manage patients	3 (10.7)
Medical issues	3 (10.7)
Psychological issues	6 (21.4)

The results presented in table 3 showed that 63% (n=80) of the enrolled physicians believe that Laparoscopic sleeve gastrectomy is the ideal bariatric surgical procedure in the average patients, whereas 10.2% (n=13) reported that the Laparoscopic adjustable gastric band is the ideal bariatric procedure. In addition, about 1.6% (n=2) reported that Laparoscopic Roux-en-Y gastric bypass is the ideal bariatric surgery procedure in the average patients, and only 0.8% (n=1) indicated that Duodenal Switch/Bilio pancreatic Diversion is the ideal bariatric surgery procedure in the average patients. Finally, about 24.4% (n=31) of the enrolled physicians were unsure about the idea bariatric surgical procedure in the average patients.

Exploring the patients' preferences regarding the type of the bariatric surgery from the perspective of the enrolled physicians reported that 63.8% (n=81) of the physicians reported that patients are interested more in Laparoscopic sleeve gastrectomy, whereas 3.1% (n=4) reported that patients are interested more in Laparoscopic Roux-en-Y gastric bypass. In addition, about 22.8% (n=29) of the enrolled physicians reported that patients' interests regarding the type of the bariatric surgery is not specified, and 3.1% (n=4) of the physicians reported that patients are interested in more than two of the mentioned types of bariatric surgeries. Finally, about 7.1% (n=9) reported that patients never showed an interest in the type of bariatric surgery.

The findings of the current study showed that 39.4% (n=50) reported that less than 10% of the morbid obese patients inquire about bariatric surgery, whereas 27.6% (n=35) reported that 10 to 20% of the morbid obese patients inquire about the bariatric surgery. In addition, it was found that 12.6% (n=16) of the enrolled physicians reported that 21 to 30% of the morbid obese inquire about the bariatric surgery. Moreover, the results revealed that 11% (n=14) of the enrolled physicians reported that more than 40% of the morbid obese patients inquire about the bariatric surgery. Finally, it was found that 9.4% (n=12) of the enrolled physicians reported that 31 to 40% of the morbid obese patients inquire about the bariatric surgery.

The findings of the present study showed that BMI (89.7%, n=113) and comorbidities (82.5%, n=104) were the most factors influencing the decision to refer to bariatric surgery. However, the enrolled physicians reported other reasons such as age (41.3%, n=52), number of attempts at dieting (42.9%, n=54), use of pharmacotherapy for obesity (22.2%, n=28), and patient desire for procedures (35.7%, n=45).

**Table 3** Physician's knowledge of and patient interest in bariatric surgery

Ideal bariatric surgical procedure in the average patient	
Laparoscopic Roux-en-Y gastric bypass	2 (1.6)
Laparoscopic sleeve gastrectomy	80 (63)
Laparoscopic adjustable gastric band	13 (10.2)
Duodenal Switch/Biliopancreatic Diversion	1 (0.8)
Unsure	31 (24.4)
type of bariatric surgery patients show most interest in	
Laparoscopic Roux-en-Y gastric bypass	4 (3.1)
Laparoscopic sleeve gastrectomy	81 (63.8)
not specified	29 (22.8)
More than two of the above	4 (3.1)
Never show interest	9 (7.1)
Number of morbidly obese patients inquire about bariatric surgery	
<10%	50 (39.4)
10-20%	35 (27.6)
21-30%	16 (12.6)
31-40%	12 (9.4)
>40%	14 (11)
What influence the decision to refer to bariatric surgery (n=...)	
BMI	113 (89.7)
Comorbidities	104 (82.5)
Age	52 (41.3)
Number of attempts at dieting	54 (42.9)
Use of pharmacotherapy for obesity	28 (22.2)
Pt desire for procedures	45 (35.7)

The results shown in table 4 represent a comparative analysis of the opinions of the enrolled physicians about bariatric surgery in terms of referral or no referral to bariatric surgery. The results showed that 87.9% (n=94) agreed that "morbidly obese patients should attempt dieting for at least 6 months before considering surgery", 89.2% (n=74) agreed that they "have had morbidly obese patients who were successful at losing weight without surgery". In addition, the results showed that 97.8% (n=44) of physicians agreed that "bariatric surgeries result in sustained weight loss". Moreover, about 98.2% (n=56) of the enrolled physicians "felt comfortable explaining the procedural options to a patient" and 97.3% (n=71) "felt comfortable providing care to patients who have received bariatric surgery". Finally, it was found that 89.2% (n=91) agreed that "additional continuing medical education resources in bariatric surgical care would be useful to physicians in our center".

**Table 4** Opinions about bariatric surgery: comparison between physicians who have made previous referrals for surgery to those with no previous referrals

		Yes	No	OR	CI	p-value
"Morbidly obese patients should attempt dieting for at least 6 months before considering surgery"	Agree	94 (87.9)	13 (12.1)	-	-	0.364
"I have had	Disagree	6 (100)	0			

“Bariatric surgeries result in sustained weight loss”	Disagree	11 (91.7)	1 (8.3)			
“I feel comfortable explaining the procedural options to a patient”	Agree	44 (97.8)	1 (2.2)	7.135	0.821-61.973	0.055*
“I feel comfortable providing care to patients who have received bariatric surgery”	Disagree	37 (86)	6 (14)			
“Additional continuing medical education resources in bariatric surgical care would be useful to physicians in our center”	Agree	56 (98.2)	1 (1.8)	25.667	3.136-210.065	0.000
	Disagree	24 (68.6)	11 (31.4)			
	Agree	71 (97.3)	2 (2.7)	28.4	5.267-153.143	0.000
	Disagree	10 (55.6)	8 (44.4)			
	Agree	91 (89.2)	11 (10.8)	0.919	0.106-7.96	0.939
	Disagree	9 (90)	1 (10)			

The results presented in table 5 shows univariate analysis of the perspectives of enrolled physicians based on history of patient's referral to bariatric surgery. The results revealed that physicians aged 36 to 45 years were 5.7 times more likely to refer patients to bariatric surgery (OR: 5.7, ci: 0.655-49.577, P=0.118). In addition, it was found that physicians who had 11 to 20 years of practice were 1.78 times more likely to patient's referral to bariatric surgery (OR:1.78, CI: 0.419-7.588). However, the results showed no significant association between physician's level, specialty and patient load on one hand and referral of morbid obese patients to bariatric surgery on the other hand.

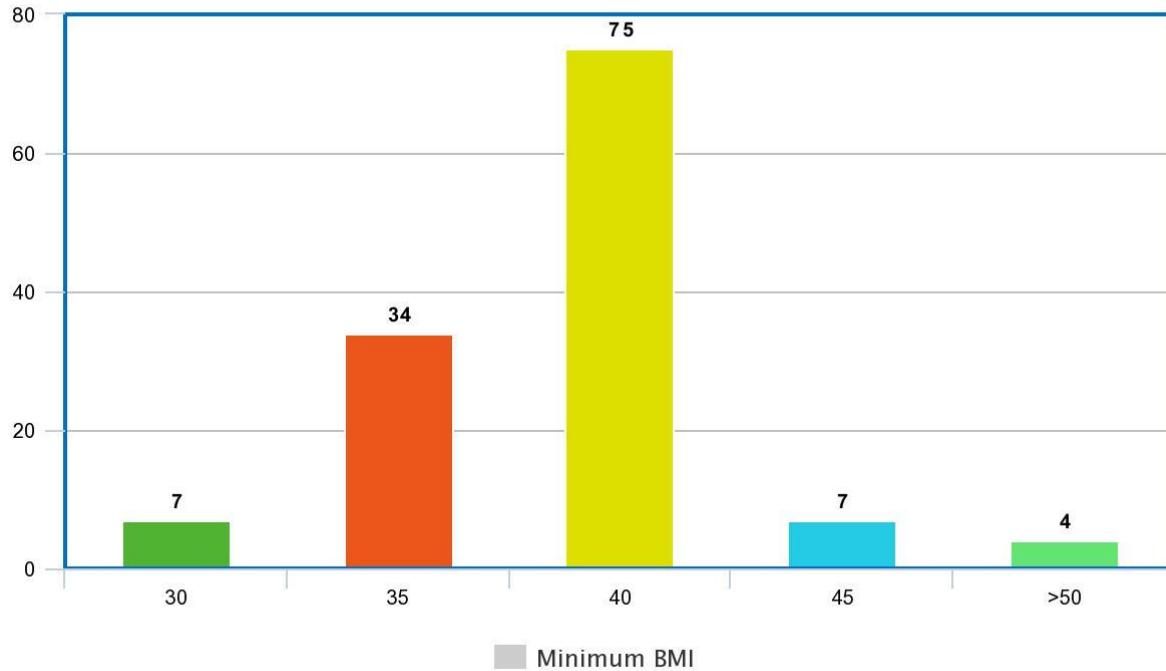
**Table 5** Univariate analysis of the perspectives of physicians based on history of referrals

Variable	Yes	No	OR	CI	p-value
<b>Age</b>					
26-35	40 (87)	6 (13)			
36-45	38 (97.4)	1 (2.6)	5.7	0.655-49.577	0.118*
46-55	12 (85.7)	2 (14.3)	0.9	0.16-5.053	0.905
56-65	20 (76.9)	6 (23.1)	0.5	0.143-1.749	0.273
66-75	1 (100)	0	-	-	0.699
<b>Years in practice</b>					
0-10	46 (88.5)	6 (11.5)			
11-20	41 (93.2)	3 (6.8)	1.78	0.419-7.588	0.501*
21 and more	24 (80)	6 (20)	0.522	0.152-1.793	0.296
<b>Level</b>					

Consultant	73 (90.1)	8 (9.9)			
Registrar	10 (90.9)	1 (9.1)	1.096	0.124-9.708	0.934
Fellow	28 (82.4)	6 (17.6)	0.511	0.163-1.607	0.245
<b>Specialty</b>					
Family medicine	37 (94.9)	2 (5.1)			
Internal medicine	28 (80)	7 (20)	0.216	0.042-1.122	0.075
Obstetrics and gynecology	16 (76.2)	5 (23.8)	0.173	0.03-0.987	0.045
General surgery	11 (100)	0	-	-	1
Ortho	19 (95)	1 (5)	1.027	0.087-12.062	1
<b>Patient load</b>					
<25	19 (79.2)	5 (20.8)			
26-50	70 (88.6)	9 (11.4)	2.047	0.613-6.83	0.237
50-100	15 (93.8)	1 (6.3)	3.947	0.416-37.498	0.373
>100	7 (100)	0	-	-	0.562

The results shown in figure 1 indicated that 59.1% (n=75) of the enrolled physicians reported that the minimum BMI to consider bariatric surgery appropriate for a patient without weight related comorbidities is 40kg/m<sup>2</sup>, whereas 26.8% (n=34) reported that the minimum BMI is 35 and 5.5% (n=7) believed that a minimum BMI of 30 is the minimum BMI to consider bariatric surgery appropriate for a patient without weight related comorbidities. Moreover, about 5.5% (n=7) believed that a BMI of 45 is the appropriate one, whereas 3.1% (n=4) reported that a BMI higher than 50 is the minimum to consider a patient referral to bariatric surgery.

Figure (1): At what minimum BMI would you consider bariatric surgery appropriate for a patient WITHOUT weight related comorbidities?



meta-chart.com

The findings shown in table 5 revealed that 48% (n=61) of the enrolled physicians were supportive of bariatric surgery for patients with diabetes and BMI<35, whereas 30.7% (n=39) were not supportive. However, 21.3% (n=27) were unsure of bariatric

surgery in case of diabetic patients having a BMI less than 35. Finally, it was found that 63% (n=80) reported that they would refer a family member or a friend for gastric bypass surgery.

**Table 5** Physicians' perceptions regarding patient's referral to bariatric surgery

Are you supportive of bariatric surgery for patients with diabetes and BMI<35	
No	39 (30.7)
Yes	61 (48)
Unsure	27 (21.3)
Would refer a family member or a friend for gastric bypass surgery	
	80 (63)

#### 4. DISCUSSION

For the severely obese person, the chance of losing and keeping off enough weight to make a health difference (20% excess weight) is in the range of 3% at most (Thom & Lean, 2018). Metabolic and bariatric surgery is indicated for patients who have class III and class IV obesity, a BMI of 40 and over is alone an adequate indication, and it is also indicated for class II obesity; a BMI of 35 to 40 with patients who have certain medical problems, such as hypertension, diabetes, and the chronic diseases that are commonly associated with high morbidity that are also associated with obesity (Rubino et al., 2016). The present study aimed at investigating the perceptions of Saudi Physicians working in KSUMC about bariatric surgery and its role in obesity management, in addition to identifying the factors influencing the referral of a patient to a bariatric surgery. The findings of the present study showed that most of the physicians are measuring the patient's weight each visit, which could be referred to that triaging process adopted in the medical wards and outpatient clinics include documenting the patient's anthropometric measurements that include BMI. However, waist circumference measurement was less prevalent as it could be needed for specific cases and physicians might get sufficient data through BMI measurements.

Our findings revealed that more than half of the enrolled physicians initiated conversations with their patients about bariatric surgery, which could be referred to that bariatric surgery is one of the options in the treatment plan of those patients. This is evidenced by Allahverdi (2019) who reported that bariatric surgery is becoming a major part of the treatment of morbid obese patients. Moreover, the findings of the study showed that about two-thirds of the enrolled physicians had an access to appropriate resources and equipment for managing morbidly obese patients and were aware of whom they should contact when encountering any difficulty managing patients with morbid obese patients. This might be referred to that in the last decade, there was a significant increase in the bariatric surgeries performed in Saudi Arabia, which imposed the healthcare facilities, either public or private, to improve the resources supplies and experts in this field within the different healthcare settings. This is evidenced by Al-Khaldi (2021) who reported increased prevalence of bariatric surgeries, even within private clinics and hospitals. Al-Khaldi (2021) stressed the need for governmental monitoring over the bariatric surgeries due to the increased prevalence of those types of surgeries.

Further, the findings of this study showed that despite that the great majority of the enrolled physicians had referred patients to bariatric surgery, still a number of physicians reported different reasons for not referring, including lack of resources, lack of awareness about procedure and benefits, and concerns of follow up. This result might be attributed to that there are still specific concerns regarding the risks of complications of bariatric surgeries, the issue that could be considered a barrier for not referring patients to bariatric surgery. This result is evidenced by the findings reported by Altaf & Abbas (2019) study, which revealed a significant lack of awareness about the bariatric surgery benefits and risks, in addition to the absence of rules and regulations governing the bariatric surgeries in private healthcare settings, which caused a state of inconsistency about the knowledge and awareness regarding the bariatric surgeries.

Our findings revealed that Laparoscopic sleeve gastrectomy was the most ideal bariatric surgery as perceived by the enrolled physicians. This result might be referred to that this type of bariatric surgery is the most safe and effective bariatric procedure for obese and morbid obese patients. This result is supported by the findings reported by Gluck et al., (2011) and Elhag & El Ansari (2020) who found that Laparoscopic sleeve gastrectomy is the most effective and safe bariatric procedure yielding excellent outcomes and least risks for obese and morbid obese patients, in addition to its capacity to address the metabolic derangements related to obesity. Moreover, it was found that this type of surgery is the most common and preferred type by patients, which could be referred to its effectiveness and its relative technical ease (Gluck et al., 2011; Elhag & El Ansari, 2020).

Moreover, it was found that less than 20% of morbidly obese patients inquire about the bariatric surgeries. This findings could be attributed to a significant lack of knowledge and awareness among morbid obese patients about the bariatric surgeries and its role in weight loss, which is evidenced by the findings reported by Bu Bshait et al., (2019) who found that there is a lack of knowledge about the effectiveness, safety and complications of bariatric surgeries among Saudi adult citizens. In addition, Bu Bshait et al., (2019) highlighted the lack of knowledge sources that could provide the patients with sufficient knowledge about the bariatric surgeries, as social media and word-of-mouth from patients who underwent bariatric surgeries were the most common sources of knowledge about bariatric surgeries.

Increased BMI and obesity comorbidities were reported significantly by the participating physicians as the factors influencing the decision to refer patients to a bariatric surgery. This result could be attributed to that resorting to bariatric surgeries occurs in case the aim of the treatment plan for morbid obese patients is to lose weight and reduce the morbidities of morbid obesity (Alreshidi et al., 2020; Alrashid et al., 2021; Mahmoud et al., 2021). These findings are in line with the results of Roberson et al., (2016) who found that reducing obesity complications and increased BMI that limits the patient's physical activity were the main factors influencing the patient's decision to undergo a bariatric surgery.

Exploring the physicians' opinion about the bariatric surgery revealed that there is a high agreement that morbidly obese patients should try to diet for at least 6 months before considering surgery. This might be referred to the physicians' belief that the surgical procedure should be the last option to lose weight among morbid obese patients, and this was evidenced by that the majority of physicians reported that they had morbidly obese patients who were successful at losing weight without surgery. Moreover, this result could be referred to that physicians seek to avoid any complications of bariatric surgeries especially that they reported that bariatric surgeries result in a sustained weight loss.

However, the majority of the enrolled physicians reported that they are comfortable when explaining the procedure to a patient, which might be referred to physician's sense of responsibility of educating patients and provide them with reliable information about the bariatric surgeries as an option of treating morbid obesity and reducing its complications. This is evidenced by that a great majority of the enrolled physicians were comfortable providing care to patients who underwent bariatric surgeries. Further, a significant number of physicians reported the need for further resources to get better knowledge about bariatric surgical care. This might be referred to the continuous developments of bariatric surgical techniques that require physicians to keep informed and updated in order to provide the highest quality of care.

Our findings suggested that medium aged physicians (36 to 45 years) and physicians who had 11 to 20 years of experience were more likely to refer patients to bariatric surgeries compared to other age categories. Yet, there is no established research-based evidence of the association of age with referral to bariatric surgery. However, this could be referred to that this category of physicians could be the most contemporary group of the beginnings of bariatric surgery and its developments within the last decades. Finally, more than half of the surveyed physicians reported that  $40 \text{ kg/m}^2$  is the minimum BMI that would be considered to refer a patient without weight related comorbidities to a bariatric surgery. This might be attributed to that bariatric surgery should be performed to avoid any weight-related complications as a proactive procedure to avoid any future complications among obese and morbid obese patients. This is evidenced by the results reported by Haghigat et al., (2020) who reported that bariatric surgery significantly reduces the long-term complications of obesity.

In addition, the results of this study found that nearly half of the enrolled physicians are supportive for bariatric surgery for diabetic patients having BMI less than 35, whereas the other half were either non-supportive or unsure about this issue. This result highlights a consistency of knowledge about the need for bariatric surgery for diabetic patients and stresses the need for educational and research-based evidences related to conducting bariatric surgery for diabetic patients as a proactive procedure. Moreover, it was found that the majority of the physicians would refer a family member or a friend for gastric bypass surgery, which could be reflected to the physicians' perceptions of the benefits of this procedure in controlling patient's weight and reducing further medical complications.

Despite the promising findings of the present study, still there are a number of limitations that could limit the generalization of those findings. First, is the design of the study, which could impose a kind of bias in the responses, as the data collection tool was a self-filled questionnaire. Therefore, improving the design of this study and using qualitative data collection tool could yield more generalizable results. A second limitation is the geographical limitations, as the present study was conducted in King Saud University Medical City (KSUMC) and included family medicine, internal medicine and obstetrics and gynecology physicians. Extending this study to include different healthcare facilities would improve the outcome of this study and provide better insight about the perceptions of Saudi physicians about the bariatric surgeries and its associated benefits and risks.

## 5. CONCLUSION

The world is facing a healthcare crisis with obesity and it is become apparent that obesity may in fact actually decrease life expectancy in the present generation. In addition, the cost of obesity is huge and gets a high share of the healthcare system expenditures in most of the countries around the world. This study provided an insight about the knowledge and perceptions of family medicine, internal medicine and obstetrics and gynecology physicians in KSUMC about bariatric surgery. The findings showed that there is a satisfactory level of knowledge and positive perceptions of physicians about bariatric surgery. However, lack of resources and lack of awareness were major reasons for not referring patients to bariatric surgery when needed. In addition, still there is a lack of knowledge regarding the ideal bariatric surgical procedure in the average patient, which highlights the need to educate the physicians about the differences, benefits and risks of different types of bariatric surgeries. Based on the findings of the present study, the study recommends conducting educational sessions and training programs for family medicine, internal medicine and obstetrics and gynecology physicians at KSUMC regarding the latest developments in bariatric surgery, in addition, to educating patients as well about medical conditions that require resorting to bariatric surgery.

### Acknowledgment

The authors would like to extend their gratitude to King Saud University Medical City (KSUMC) for their unlimited support during the data collection process in this study. In addition, the authors would like to thank the participants for spending their valuable time filling in the study questionnaire and contributing to the accomplishment of this manuscript.

### Author contribution

The authors would like to declare that all authors of this manuscript had contributed equally in the production of this final version of the original research paper. All authors contributed equally in reviewing literature, designing methodology, data collection and processing, writing the manuscript and reviewing the final version.

### Informed consent

A written informed consent was obtained from all physicians recruited and participated in this study. Additional informed consent was obtained from individuals and institutions whom identifying information are included in this manuscript.

### Ethical approval

This study was approved by the Institutional Review Board of King Saud University Medical City (Ref. No. 20/0004/IRB).

### Funding

This study has not received any external funding.

### Conflict of Interest

The authors declare that there are no conflicts of interests.

### Data and materials availability

All data associated with this study are present in the paper.

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